

What is claimed is:

1. A polishing system, comprising:
  - a platen adapted to receive a wafer; and
  - a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length,
    - wherein the polishing pad drum is adapted to rotate about the axis of rotation along the drum length, and
    - wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other.
2. The polishing system of claim 1, wherein the platen is adapted to be linearly moved with respect to the polishing pad.
3. The polishing system of claim 1, wherein the polishing pad drum is adapted to be linearly moved with respect to the platen.
4. The polishing system of claim 1, wherein the polishing pad drum is adapted to be moved to provide a predetermined minimum distance between the polishing pad drum and the platen as the polishing pad drum and the platen pass each other due to the linear motion.
5. The polishing system of claim 1, wherein the platen is adapted to be moved to provide a predetermined minimum distance between the polishing pad drum and the platen as the polishing pad drum and the platen pass each other due to the linear motion.
6. The polishing system of claim 1, wherein the polishing pad drum is embedded with a polishing abrasive.

7. The polishing system of claim 1, further comprising a slurry applicator adapted to provide a slurry on the wafer.
8. The polishing system of claim 1, wherein a tangential force between the polishing pad drum and the platen is produced when the polishing pad drum is rotated, and wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other to move the wafer with respect to the polishing pad drum in the direction of the tangential force.
9. The polishing system of claim 1,  
wherein the linear movement of at least one of the polishing pad drum and the platen is capable of being represented by a linear motion vector,  
wherein the linear motion vector is capable of being projected onto a parallel plane that contains the axis of rotation of the polishing pad drum, and  
wherein the projected linear motion vector is generally perpendicular to the axis of rotation.
10. The polishing system of claim 1, further comprising a finely tuned laser beam adapted to dress the polishing pad drum.
11. The polishing system of claim 1, wherein the polishing pad drum is rigid.
12. The polishing system of claim 1, wherein a rigid polishing pad forms the polishing pad drum.
13. The polishing system of claim 1, wherein the polishing pad drum includes a drum center and a polishing pad around the drum center.

14. A polishing system, comprising:
- a platen adapted to receive a wafer;
  - a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length; and
  - a planarizing system adapted to dress the polishing pad drum,
- wherein the polishing pad drum is adapted to rotate about the axis of rotation along the drum length,
- wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other to polish the surface of the wafer, and
- wherein the polishing pad drum and the platen are adapted to be operably positioned to provide a predetermined minimum distance between the polishing pad drum and the platen as the polishing pad drum and the platen pass each other due to the linear motion.
15. The polishing system of claim 14, wherein the planarizing system includes a finely tuned laser beam adapted to dress the polishing pad drum.
16. The polishing system of claim 14, wherein the platen is adapted to be linearly moved with respect to the polishing pad drum.
17. The polishing system of claim 14, wherein the polishing pad drum is adapted to be linearly moved with respect to the platen.
18. The polishing system of claim 14, wherein the polishing pad drum is embedded with a polishing abrasive.
19. The polishing system of claim 14, further comprising a slurry applicator adapted to provide a slurry on the wafer.

20. The polishing system of claim 14, wherein a tangential force between the drum and the platen is produced when the drum is rotated, and wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other so as to move the wafer with respect to the polishing pad drum in the direction of the tangential force.
21. The polishing system of claim 14,  
wherein the linear movement of at least one of the polishing pad drum and the platen is capable of being represented by a linear motion vector,  
wherein the linear motion vector is capable of being projected onto a parallel plane that contains the axis of rotation of the polishing pad drum, and  
wherein the projected linear motion vector is generally perpendicular to the axis of rotation.
22. The polishing system of claim 14, wherein the polishing pad drum is rigid.
23. The polishing system of claim 14, wherein a rigid polishing pad forms the polishing pad drum.
24. The polishing system of claim 14, wherein the polishing pad drum is adapted to be moved to provide the predetermined minimum distance and to compensation for a drum diameter loss due to a dressing operation performed by the planarizing system on the polishing pad drum.
25. The polishing system of claim 14, wherein the platen is adapted to be moved to provide the predetermined minimum distance and to compensation for a drum diameter loss due to a dressing operation performed by the planarizing system on the polishing pad drum.

26. A polishing system, comprising:
- a platen adapted to receive a wafer;
  - a rigid polishing pad formed into a polishing pad drum that has a generally cylindrical shape with a length and an axis of rotation along the length; and
  - a finely tuned laser beam adapted to dress the polishing pad drum,
- wherein the polishing pad drum is adapted to rotate about the axis of rotation along the drum length,
- wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other,
- wherein the polishing pad drum and the platen are adapted to be operably positioned to provide a predetermined minimum distance between the polishing pad drum and the platen as the polishing pad drum and the platen pass each other due to the linear motion,
- wherein a tangential force between the drum and the platen is produced when the drum is rotated, and
- wherein at least one of the polishing pad drum and the platen are adapted to be linearly moved with respect to the other to move the wafer with respect to the polishing pad drum in the direction of the tangential force.
27. The polishing system of claim 26, wherein the platen is adapted to be linearly moved with respect to the polishing pad.
28. The polishing system of claim 26, wherein the polishing pad drum is adapted to be linearly moved with respect to the platen.
29. The polishing system of claim 26, wherein the polishing pad drum is adapted to be moved to provide the predetermined minimum distance and to compensation

for a drum diameter loss due to a dressing operation performed by the planarizing system on the polishing pad drum.

30. The polishing system of claim 26, wherein the platen is adapted to be moved to provide the predetermined minimum distance and to compensate for a drum diameter loss due to a dressing operation performed by the planarizing system on the polishing pad drum.

31. The polishing system of claim 26, wherein the polishing pad drum is embedded with a polishing abrasive.

32. The polishing system of claim 26, further comprising a slurry applicator adapted to provide a slurry on the wafer.

33. A polishing system, comprising:

a controller;

a platen adapted to receive a wafer;

a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length; and

a drive assembly coupled to the controller and adapted to rotate the drum and to linearly move at least one of the polishing pad drum and the platen to polish the wafer.

34. The polishing system of claim 33, further comprising a laser beam adapted to dress the polishing pad drum.

35. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a rotational direction of movement for the polishing pad drum.
36. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a rotational speed of movement for the polishing pad drum.
37. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a linear direction of movement for the polishing pad drum with respect to the platen.
38. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a linear direction of movement for the platen with respect to the polishing pad drum.
39. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a speed of linear movement for the platen with respect to the polishing pad drum.
40. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to control a speed of linear movement for the polishing pad drum with respect to the platen.
41. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to move the platen to provide a predetermined minimum distance with respect to the polishing pad drum when the polishing pad drum and the platen pass each other due to the linear motion.

42. The polishing system of claim 33, wherein the controller and the drive assembly are adapted to move the polishing pad drum to provide a predetermined minimum distance with respect to the polishing pad drum when the polishing pad drum and the platen pass each other due to the linear motion.

43. The polishing system of claim 33, wherein the linear motion of at least one of the polishing pad drum and the platen is capable of being represented by a linear motion vector, wherein the linear motion vector is capable of being projected onto a parallel plane that contains the axis of rotation of the polishing pad drum, and wherein the projected linear motion vector is generally perpendicular to the axis of rotation.

44. The polishing system of claim 33, wherein the control unit includes an electronic system comprising a control unit, a processor coupled to the control unit, a memory coupled to the control unit and the processor, and input/output devices coupled to the control unit and the processor.

45. A polishing system, comprising:  
a controller;  
a platen adapted to receive a wafer;  
a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length;  
a drive assembly coupled to the controller and adapted to rotate the drum and to linearly move at least one of the polishing pad drum and the platen to polish the wafer; and  
a planarizing system coupled to the controller and adapted to dress the polishing pad.

46. The polishing system of claim 45, wherein the drive assembly and controller are adapted to move at least one of the platen and the polishing pad drum to provide a predetermined minimum distance between each other when the polishing pad drum and the platen pass each other due to the linear motion, and wherein the controller is coupled to the planarizing system and is adapted to provide precise thickness control by coordinating a dressing operation performed on the polishing pad drum and the movement of at least one of the platen and the polishing pad drum.

47. A polishing system, comprising:

- a controller;
- a platen adapted to receive a wafer;
- a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length;
- a drum drive assembly coupled to the controller and adapted to rotate the drum; and
- a platen drive assembly coupled to the controller and adapted to linearly move the platen with respect to the polishing pad drum and further adapted to move the platen to provide a predetermined minimum distance with respect to the polishing pad drum when the polishing pad drum and the platen pass each other due to the linear motion.

48. The polishing system of claim 47, further comprising a planarizing system adapted to dress the polishing pad drum, wherein the planarizing system is coupled to the controller.

49. A polishing system, comprising:

- a controller;

a platen adapted to receive a wafer;  
a polishing pad drum having a cylindrical shape with a length and an axis of rotation along the length;  
a platen drive assembly coupled to the controller and adapted to linearly move the platen with respect to the polishing pad drum; and  
a drum drive assembly coupled to the controller and adapted to rotate the drum and further adapted to move the polishing pad drum to provide a predetermined minimum distance with respect to the polishing pad drum when the polishing pad drum and the platen pass each other due to the linear motion.

50. The polishing system of claim 49, further comprising a planarizing system adapted to dress the polishing pad drum, wherein the planarizing system is coupled to the controller.

51. A method for planarizing a wafer, comprising:  
positioning the wafer on a platen;  
rotating a polishing pad drum; and  
creating a linear movement between the polishing pad drum and the platen to polish the wafer.

52. The method of claim 51, wherein rotating the polishing pad drum produces a tangential force between the polishing pad drum and the platen, and wherein creating a linear movement between the polishing pad drum and the platen includes creating a linear movement in the direction of the tangential force.

53. The method of claim 51, wherein rotating a polishing pad drum includes controlling a rotational speed of the drum.

54. The method of claim 51, wherein rotating a polishing pad drum includes controlling a rotational direction of the drum.
55. The method of claim 51, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed of the platen.
56. The method of claim 51, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear direction of the platen.
57. The method of claim 51, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed of the drum.
58. The method of claim 51, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear direction of the drum.
59. The method of claim 51, wherein creating a linear movement between the polishing pad drum and the platen includes providing a linear movement that has a projected linear motion vector on a parallel plane that contains an axis of rotation for the polishing pad drum such that the projected linear motion vector is generally perpendicular to the axis of rotation.
60. The method of claim 51, further comprising setting a minimum distance between the platen and the polishing pad drum as the platen and the polishing pad drum pass each other.
61. A method for planarizing a wafer, comprising:

positioning the wafer on a platen;  
rotating a polishing pad drum;  
dressing the polishing pad drum with a planarizing system; and  
creating a linear movement between the polishing pad drum and the platen to  
polish the wafer.

62. The method of claim 61, wherein dressing the polishing pad drum with a planarizing system includes dressing the polishing pad drum with a finely tuned laser beam.

63. The method of claim 61, wherein rotating the polishing pad drum produces a tangential force, and wherein creating a linear movement between the polishing pad drum and the platen includes creating a linear movement in the direction of the tangential force.

64. The method of claim 61, wherein rotating a polishing pad drum includes controlling a rotational speed and rotational direction of the polishing pad drum.

65. The method of claim 61, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed of the platen.

66. The method of claim 61, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear direction of the platen.

67. The method of claim 61, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed of the polishing pad drum.

68. The method of claim 61, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear direction of the polishing pad drum.
69. The method of claim 61, wherein creating a linear movement between the polishing pad drum and the platen includes providing a linear movement that has a projected linear motion vector on a parallel plane that contains an axis of rotation for the polishing pad drum such that the projected linear motion vector is generally perpendicular to the axis of rotation.
70. The method of claim 61, further comprising moving the platen to set a minimum distance between the platen and the polishing pad drum as the platen and the polishing pad drum pass each other.
71. The method of claim 61, further comprising moving the polishing pad drum to set a minimum distance between the platen and the polishing pad drum as the platen and the polishing pad drum pass each other.
72. A method for planarizing a wafer, comprising:  
positioning the wafer on a platen;  
rotating a polishing pad drum;  
dispensing a polishing slurry; and  
creating a linear movement between the polishing pad drum and the platen to polish the wafer using the polishing slurry.
73. The method of claim 72, wherein rotating the polishing pad drum produces a tangential force between the polishing pad drum and the platen, and wherein

creating a linear movement between the polishing pad drum and the platen includes creating a linear movement in the direction of the tangential force.

74. The method of claim 72, wherein rotating a polishing pad drum includes controlling a rotational speed and rotational direction of the polishing pad drum.

75. The method of claim 72, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed and a linear direction of the platen.

76. The method of claim 72, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed and a linear direction of the polishing pad drum.

77. A method for planarizing a wafer, comprising:  
providing a polishing pad drum with an embedded polishing abrasive;  
positioning the wafer on a platen;  
rotating the polishing pad drum; and  
creating a linear movement between the polishing pad drum and the platen to polish the wafer using the embedded polishing abrasive.

78. The method of claim 77, wherein rotating the polishing pad drum produces a tangential force at the drum periphery between the polishing pad drum and the platen, and wherein creating a linear movement between the polishing pad drum and the platen includes creating a linear movement in the direction of the tangential force.

79. The method of claim 77, wherein rotating a polishing pad drum includes controlling a rotational speed and rotational direction of the polishing pad drum.

80. The method of claim 77, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed and a linear direction of the platen.

81. The method of claim 77, wherein creating a linear movement between the polishing pad drum and the platen includes controlling a linear speed and a linear direction of the polishing pad drum.

82. A process, comprising:  
dressing a polishing pad drum;  
positioning a wafer on a platen;  
setting a predetermined distance between the polishing pad drum and the platen when they pass each other;  
polishing the wafer by rotating the polishing pad drum and creating a linear movement between the polishing pad drum and the platen;  
removing the wafer from the platen; and  
performing a semiconductor fabrication process on the wafer.

83. The process of claim 82, further comprising:  
determining whether the wafer is to be polished again; and  
upon determining that the wafer is to be polished again,  
positioning the wafer on the platen,  
setting a predetermined distance minimum between the polishing pad  
drum and the platen when they pass each other, and

polishing the wafer again by rotating the polishing pad drum and  
creating a linear movement between the polishing pad drum  
and the platen.

84. The process of claim 82, further comprising:
  - upon determining that the wafer is to be polished again, determining whether the polishing pad drum is to be dressed; and
  - upon determining that the polishing pad drum is to be dressed, dressing the polishing pad drum prior to polishing the wafer again.
85. The process of claim 82, further comprising:
  - determining whether another semiconductor fabrication process is to be performed; and
  - upon determining that another semiconductor fabrication process is to be performed, performing another semiconductor fabrication process, and
  - determining whether the wafer is to be polished again.
86. The process of claim 82, wherein setting a predetermined minimum distance between the polishing pad drum and the platen when they pass each other includes moving the platen to provide the predetermined minimum distance.
87. The process of claim 82, wherein setting a predetermined minimum distance between the polishing pad drum and the platen includes moving the polishing pad drum to provide the predetermined minimum distance.
88. The process of claim 82, wherein creating a linear movement between the polishing pad drum and the platen includes linear moving the platen with respect to the polishing pad drum.

89. The process of claim 82, wherein creating a linear movement between the polishing pad drum and the platen includes linear moving the polishing pad drum with respect to the platen.
90. A process, comprising:
- dressing a polishing pad drum;
  - setting a predetermined distance between the polishing pad drum and the platen when they pass each other;
  - polishing the wafer by rotating the polishing pad drum and creating a linear movement between the polishing pad drum and the platen;
  - determining whether the wafer is to be polished again;
  - upon determining that the wafer is to be polished again, determining whether the polishing pad is to be dressed;
  - upon determining that the polishing pad is to be dressed, dressing the polishing pad drum prior to polishing the wafer again; and
  - upon determining that the polishing pad is not to be dressed, polishing the wafer again.
91. The process of claim 90, wherein determining whether the wafer is to be polished again is based on whether further polishing is required to remove a semiconductor layer.
92. The process of claim 90, wherein determining whether the polishing pad is to be dressed is based on whether the polishing pad has worn unevenly due to an uneven surface of a semiconductor layer.